Final Exam ECON3715/4715 – Labour Economics
Autumn 2021

This exam has 5 questions, with 13 sub-questions. Each sub-question counts equally. When answering the questions on the exam you should be brief and to the point! Make sure to write clearly. Difficult to decipher answers will not be counted!

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1. In this question you have to indicate whether you think the statement is true or false and explain why. You do not get any points if you only state whether the statement is true or false.

   (a) In a hedonic wage function, a negative coefficient on risk reflects that the average worker in the population dislikes risk.

False. The coefficient reflects the compensation that the marginal worker requires to accept the job. The marginal worker might differ in important ways from the average worker and the sign on risk may even go the other way compared to the average worker. The method for obtaining the hedonic wage function might also not include all characteristics of a job and the parameter on risk may suffer from omitted variable bias.

   (b) To measure the effect of migration on native workers it is a good strategy to compare neighboring labour markets with a high degree of labour mobility between the two markets but where migration increases abruptly in one market and not the other.

False. If one market is hit by a migration shock, difference-in-differences is a strategy to impute the missing counterfactual in the absence of the shock. However, if mobility is high between the two labor markets, the control group will be influenced by the treatment (i.e. the migration shock) and can no longer be used to impute the counterfactual.

   (c) An ICT technology lowers the costs of job search for unemployed workers, which can lead to higher unemployment.

True. According to sequential job search theory, the asking wage is higher for an individual with a lower cost of job search:

$$\widetilde{w} = b - c + P(w \geq \widetilde{w}) \times \frac{E(w - \widetilde{w} | w \geq \widetilde{w})}{r}$$

and the individual will be less likely to accept job offers with lower wage and the expected unemployment duration will therefore be longer. As a consequence, the equilibrium unemployment rate may go up.

2. This question is about collective bargaining with a focus on bargaining structure.

   (a) The hypothesis of a hump-shaped relationship between real wages and bargaining structure is discussed in Calmfors, L. (1993). Centralization of Wage Bargaining and Macroeconomic Performance: A Survey. *OECD Economics Department Working Papers* No. 131. Explain the arguments for a hump-shaped relationship in a closed economy and in an open economy, respectively.

   When moving from firm to sector bargaining structure, workers achieve high bargaining power and thus wages go up, while when moving from sector to national bargaining, there is a wage moderation effect from the internalization of wage externalities and thus wages go down. This is the basic argument for a "hump-shaped" relationship.
   * Closed economy: In a closed economy where real consumption wages are raised uniformly across all sectors (complete centralization), no relative prices can change in the economy. Employment and profit effects under complete centralization are the same as under complete decentralization, where firms act as price takers.
   * Open economy: prices of imports are determined in the world market; the relative price between domestic and foreign goods will rise if the real consumption wages in all domestic firms rise; the employment and profit losses from wage increases are dampened also under centralized bargaining; incentives for wage restraint under centralized wage setting are smaller in an open economy than in a closed economy.

   (b) The implications of bargaining structure for wage inequality are discussed in Moene, K. O. and M. Wallerstein (1997). Pay Inequality. *Journal of Labor Economics* 15(3): 403–430. Explain Figure 1 in this paper.

   Discussed in the notes for Lecture 5 and Seminar 3.

3. This question is about education and discrimination. The table below shows an artificial example of average earnings of men and women conditional on having completed higher education.

	Men		Women	
	Average income	Share (Pct)	Average income	Share (Pct)
No higher education	210.0	87	152.0	90
Has higher education	361.0	13	303.0	10
Total	229.6	100	167.1	100

(a) Assume that we estimate a linear expected earning functions: $E[w_i|HE, g] = \alpha_g + \beta_g HE$, where HE is a dummy for higher education and $g \in (M, W)$, where M and W denote men and women respectively. Calculate $\alpha_M, \alpha_W, \beta_M, \beta_W$. What is the observed returns to education for men and women? Under what conditions can β_M and β_W be interpreted as causal effects?

The earnings function for men is:

$$\begin{aligned} E[w|HE, M] =& \alpha_M + \beta_M HE \\ =& 210 + (361 - 210)HE \\ =& 210 + 151HE \end{aligned}$$

The earnings function for women is:

$$\begin{aligned} E[w|HE, W] =& \alpha_W + \beta_W HE \\ =& 152 + (303 - 152)HE \\ =& 152 + 151HE \end{aligned}$$

The average return for men and women are equal ($\beta_{Men} = \beta_{Women}$). However, the observed returns may be subject to omitted variable bias as we do not control for selection. We can therefore not claim that the returns are causal unless we are willing to assume that the education level is uncorrelated to other variables which affect earnings.

The students should be given points for framing their discussion in terms of missing counterfactuals and relate it to the human capital model where in this case we observe neither costs/discount rate nor the individual educational locus/earnings function (i.e. counterfactuals).

(b) What is the aggregate difference in earnings between men and women? What percentage of this difference is attributable to different levels of education? (hint: Use an Oaxaca-Blinder decomposition)

The aggregate difference is

$$E[w|M] - E[w|W] = 229.6 - 167.1 = 62.5$$

The student should realize that the average of a dummy variable is the share reported in the table. In order to find the share attributable to education, the students must perform an Oaxaca-Blinder decomposition. Using the notation of the previous question, the aggregate difference is given by:

$$E[w|M] - E[w|W] = (\alpha_M - \alpha_W) + \beta_M E[HE|M] - \beta_W E[HE|W]$$

To perform the decomposition, the student can either add and subtract $\beta_{Men} \times E[HE|W$ or $\beta_{Women} \times E[HE|M]$. Both approaches are equally acceptable. If the student adds and sutracts $\beta_{Men} \times E[HE|W]$:

$$\begin{aligned} E[w|M] - E[w|W] = &(\alpha_M - \alpha_W) \\ &+ \beta_M(E[HE|M] - E[HE|W]) \\ &+ (\beta_M - \beta_W)E[HE|W] \end{aligned}$$

The difference attributable to education is given as

$$\begin{aligned} \beta_M(E[HE|M] - E[HE|W]) &= 151 \times (13 - 10)/100 = 4.53 \\ \rightarrow Share &= \frac{4.53}{62.5} \approx 7.2\% \end{aligned}$$

If the student adds and subtracts $\beta_{Women} \times E[HE|M]$:

$$\begin{aligned} E[w|M] - E[w|W] = &(\alpha_M - \alpha_W) \\ &+ (\beta_M - \beta_W)E[HE|M] \\ &+ \beta_W(E[HE|M] - E[HE|W]) \end{aligned}$$

The difference attributable to education is given as

$$\begin{aligned} \beta_W(E[HE|M] - E[HE|W]) &= 151 \times (13 - 10)/100 = 4.53 \\ \rightarrow Share &= \frac{4.53}{62.5} \approx 7.2\% \end{aligned}$$

Since returns to education are equal across gender it does not matter which decomposition is made. This is not true when $\beta_{Men} \neq \beta_{Women}$. Points should be given for remarking on this. Rounding of numbers should not be penalized.

(c) What do we learn about gender discrimination in this artificial labour market in light of the results of the previous question and economic theories of discrimination? What may be overlooked in such calculations?

This is an open question where the student can show understanding of theory as well as the properties of OLS. The results show that education level as explained by the dummy for higher education explains relative little of the inequality. The student should discuss the validity of the Oaxaca-Blinder method. This includes (but is not limited to) the validity of using only a dummy for educational level and assuming that the remainder is due to discrimination. More variables could be included to reduce the "discrimination residual". The student should be rewarded for discussing the decomposition method in light of taste-based and statistical discrimination. If statistical discrimination is present then this may induce men and women to make different educational choices and the levels of education can therefore be a function of discrimination themselves.

4. This question is about Aggarwal, R. K. and A. A. Samwick. (1999). The Other Side of the Trade-off: The Impact of Risk on Executive Compensation. *Journal of Political Economy* 107(1): 65–105. The authors consider a principal-agent model where the principal can decide on linear contracts of the type $w = \alpha_0 + \alpha_1\pi$, where w is the compensation to the agent. The performance of the company is $\pi = x + \epsilon$ where x is the action of the agent.

(a) What do α_0 and α_1 represent? How would you relate these parameters to real-life contracts? How would the principal set α_1 in a world where the action of the agent is perfectly observed?

The parameter α_0 represents the fixed component of the wage that is independent of the performance of the agent. The performance component is described by α_1. In a fixed-wage contract, α_1 is set to zero. If there is no uncertainty, the principal would set $\alpha_1 = 1$ to perfectly align the incentive of the agent. The response to this question should reflect that material is covered in detail in the solution sheet to Lecture 8.

(b) Assume that the agent is risk-averse and have preferences $U = -e^{-r(w-c(x))}$, where r is a measure of risk aversion (where $r > 0$) and the cost function is $c(x) = \frac{1}{2}kx^2$. Assume no uncertainty and solve for the optimal effort of the agent under a linear contract. Explain the role of α_0 and r for the optimal effort of the individual?

Because there is no uncertainty, $E[U] = U$. Insert the contract and the cost function into the utility function and maximize with respect to effort:

$$U = -e^{-r(w-c(x))} = -e^{-r(\alpha_0+\alpha_1\pi-\frac{1}{2}kx^2)} = -e^{-r(\alpha_0+\alpha_1(x+\epsilon)-\frac{1}{2}kx^2)}$$

FOC:

$$\frac{\partial U}{\partial x} = U \times (-r)(\alpha_1 - kx) = 0 \Leftrightarrow x = \frac{\alpha_1}{k}$$

The student may recognize that the utility function stated here is a positive monotonic transformation of the utility function in the lecture slides and jump directly to the first-order condition stated there.

The fixed component of the contract, α_0 is not a function of the agent's action and therefore does not affect the choice of action. Risk aversion does not play a role in the decision about how much effort to provide. The risk averseness enters the problem of the principal through the participation constraint that the agent needs to be compensated for the risk in order to take on the task.

(c) The authors derive the following equation in the case where industry performance, θ, is observed:

$$\alpha_1^* = \frac{1}{1 + rk\sigma_\epsilon^2(1-\rho^2)},$$

where ρ is the correlation coefficient between ϵ and θ and $\theta \sim N(0, \sigma_\theta^2)$. Can the principal provide stronger incentives knowing θ when the correlation coefficient is negative ($\rho < 0$)? Explain the intuition for your answer.

In the seminar and the paper, the discussion is framed in terms of a positive correlation. However, in the formulation of α_1^*, the correlation coefficient is squared and it, therefore, does not matter whether the correlation is positive or negative. Thus a larger correlation (positive or negative) allows for stronger incentives. The intuition is that even when the outcome is negatively correlated, the principal can still gain additional information about the part of the outcome that is beyond the control of the agent. This makes it less risky for the agent to accept the contract and she does not need to be insured to the same degree as when the industry outcome is unobserved.

5. This question is about work flexibility. Let's consider that a new technology arrives which enables all workers to work remotely. Workers can freely choose whether to either work remotely or on-site, either in the same job as before or in a new job, but are in either case expected to maintain equal productivity.

(a) Assume that firms hold local monopsony power as in the Salop model of competition, while workers have identical preferences. Discuss how remote work

technology can impact equilibrium wages and monopsony power.

The students should be able to connect the availability of remote work to the "travel cost τ" (or the "distance α") parameter in this model and its implied effects on monopsonistic competition. As remote work becomes an option, the distance between workers and potential firms declines or equivalently the effective cost of commute goes down, implying that equilibrium wages go up while firms' monopsony power goes down.

(b) Consider now that all workers view remote work as a job amenity, but some workers prefer remote work (relative to on-site work) more than other workers. Firms can offer different wage contracts for remote and on-site work. Discuss the possible implications on equilibrium wage levels and dispersion.

The students should recognize that this is about compensating differentials: * in a compensating differentials equilibrium, as the marginal worker views remote work as a job amenity, the wage offered for remote work should be lower than the wage offered for on-site work * there would be equilibrium wage dispersion, as workers with different preferences for remote work would select into different contract types and wages NOTE: The question formulation assumes that remote work is equally available to all workers. Some students might interpret differently or raise the point that some workers have more **access** to remote work than others, which may create differences in their labor supply elasticities. For instance, workers with access to remote work can have a more elastic labor supply. This is another line of valid reasoning (given the interpretation). In that case: * in equilibrium, the wages offered to workers with access to remote work would be higher than the wages offered to workers without access * there would be equilibrium wage dispersion, as all employers can discriminate between workers with access to remote work and workers without access to remote work (requires that all employers have this information and can identify/tag workers to each group)